



MP06 – Project Controlling

WS 2012/2013



Content

Introduction

1. What is behind Controlling
2. Decision taking
3. Project calculation
4. Earned Value Management



Introduction to Werner Wetekamp

- Born in 28.05.1965
- Studying Economy in Dortmund and Cologne (Dipl. Kfm.)
- PhD examination (Dr. rer. pol.) in 1997 in Cologne in Institute for Energy Economy
- Start in RWE in August 1984
- Working in 4 different countries – the last 9 years in CZ and PL
- Leadership experience since 1998 – starting from 2002 till 08/2011: board member finance
- Termination in RWE after 27 years in 09/2011
- Almost 10 years parallel work in Fachhochschule Dortmund
- Starting from 01.09.2011 working for FH-Dortmund

Introduction of all group members



Goal of the lecture

- What is behind „Controlling“ in general
- Knowledge of Project Controlling in theory and praxis with the focus on cost controlling
- Knowledge and application of specifics project controlling methods and tools (e.g. DCF, Earned Value Management)



Finding your marks

- 75% related to your performance in the lecture
 - Participation in the lecture (Evaluated by the tutor after every lecture)
 - Participation in the students work (Evaluation by the team)
 - Presentation of the results (Evaluation by the tutor)
 - Concrete knowledge (Evaluation by the tutor)
- 25% related to your performance in the examination in the second half of January
- 3 ECTS can be achieved




1. What is behind Controlling?

- Kerzner (Project management, 2008)
 - Measure
 - Analyse
 - Correct
- Küppers: (Controlling: Konzeption, Aufgaben, Instrumente, 2008)
 - Infosystem
 - Planning
 - Control
 - Decision support
 - Systems to support leadership
 - KPI-systems
 - Support of target setting and target achievement



1. What is behind Controlling?

- Controlling is support of leading, steering, governing a project or an organisation to a financial target – it is not only checking, counting, finding mistakes
- Controlling is the core of success because it is defined as leading to the goal
 - Example: counting the volume of sold products at the end of the day: Controlling
 - Example: landing a Boing 407 in JFK New York: usage of instruments supported by controlling tools
 - Example: checking how much money we have in our pocket before you go out: part of controlling
 - Example: planning the financial performance of a project: part of controlling
 - Example: deciding to build the production hall or not: support by controlling (master of the tool)
 - Example: calculating the dollar-risk in your project: task of Controlling (four eyes principle)
- „Controlling“ we call also the department responsible for controlling tasks (planning, forecast, risk management, decision support...)



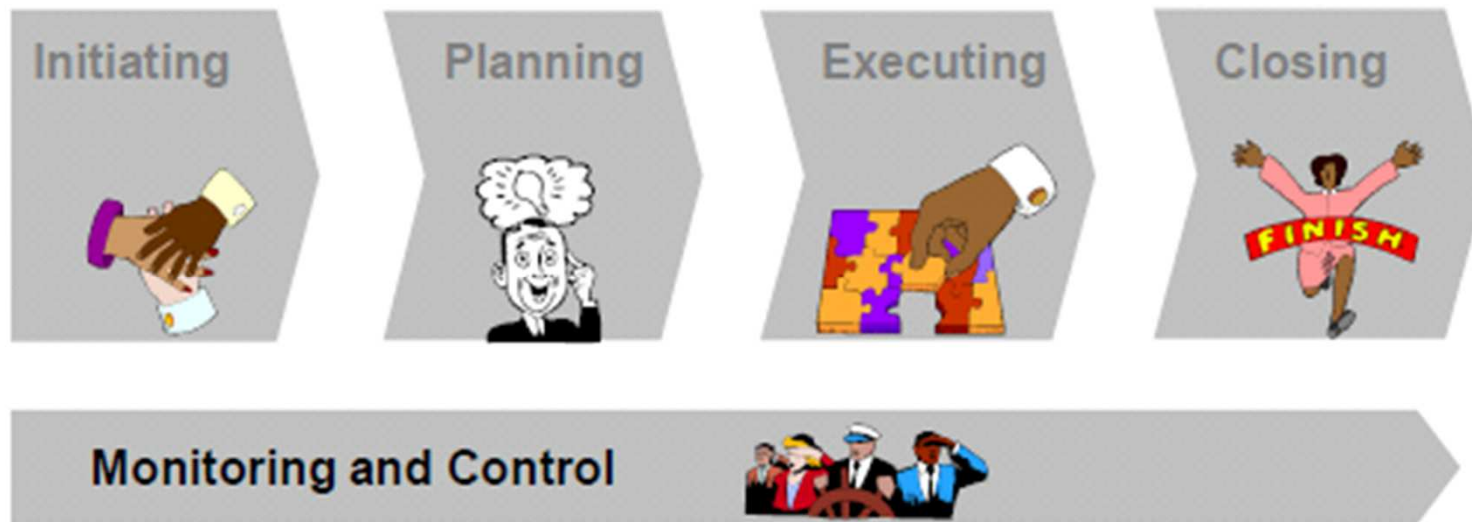
1. Controlling as a part of the project management

Project management is the application of knowledge, skills, tools, and techniques to project activities to meet the project requirements. Project management is accomplished through the appropriate application and integration of the 42 logically grouped project management processes comprising the 5 Process Groups. These 5 Process Groups are:

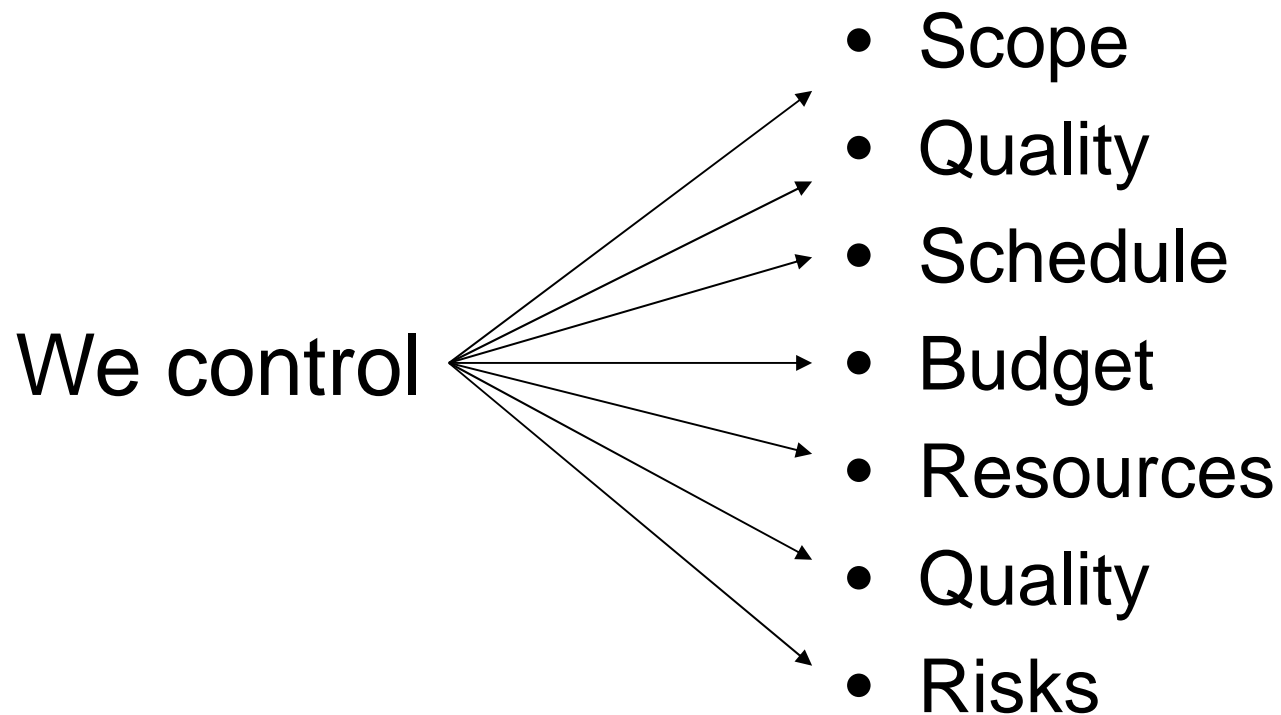
- Initiating,
- Planning,
- Executing,
- Monitoring and Controlling, and
- Closing.

1. Controlling as a part of the project management

better is this description:



1. Controlling deals with different objects





1. Controlling functions

Possible cost management process steps:

1. Analyse and decide on project, programme or portfolio cost management system.
2. Estimate and evaluate costs of each work package, including overhead costs.
3. Establish cost monitoring and controlling elements, as well as inflation and currency management if necessary.
4. Define cost objectives.
5. Calculate actual resource usage and costs or expenses incurred.
6. Take all changes and claims into account.
7. Analyse variances and causes, compare actual versus planned cost.
8. Forecast cost trends and final costs.
9. Develop and apply corrective actions.
10. Update the cost estimate with respect to changes.
11. Document lessons learnt and apply to future projects.



1. Reports in Controlling

The report is the „surface“ of project controlling on which is visible

- the project structure
- the plan
- the achieved actual's
- the forecast
- a comparison among the projects
- the objects (time, costs, risks...)

The reporting can be done standardized and by Project Office or if the project is performed as a unique one also from the project participants

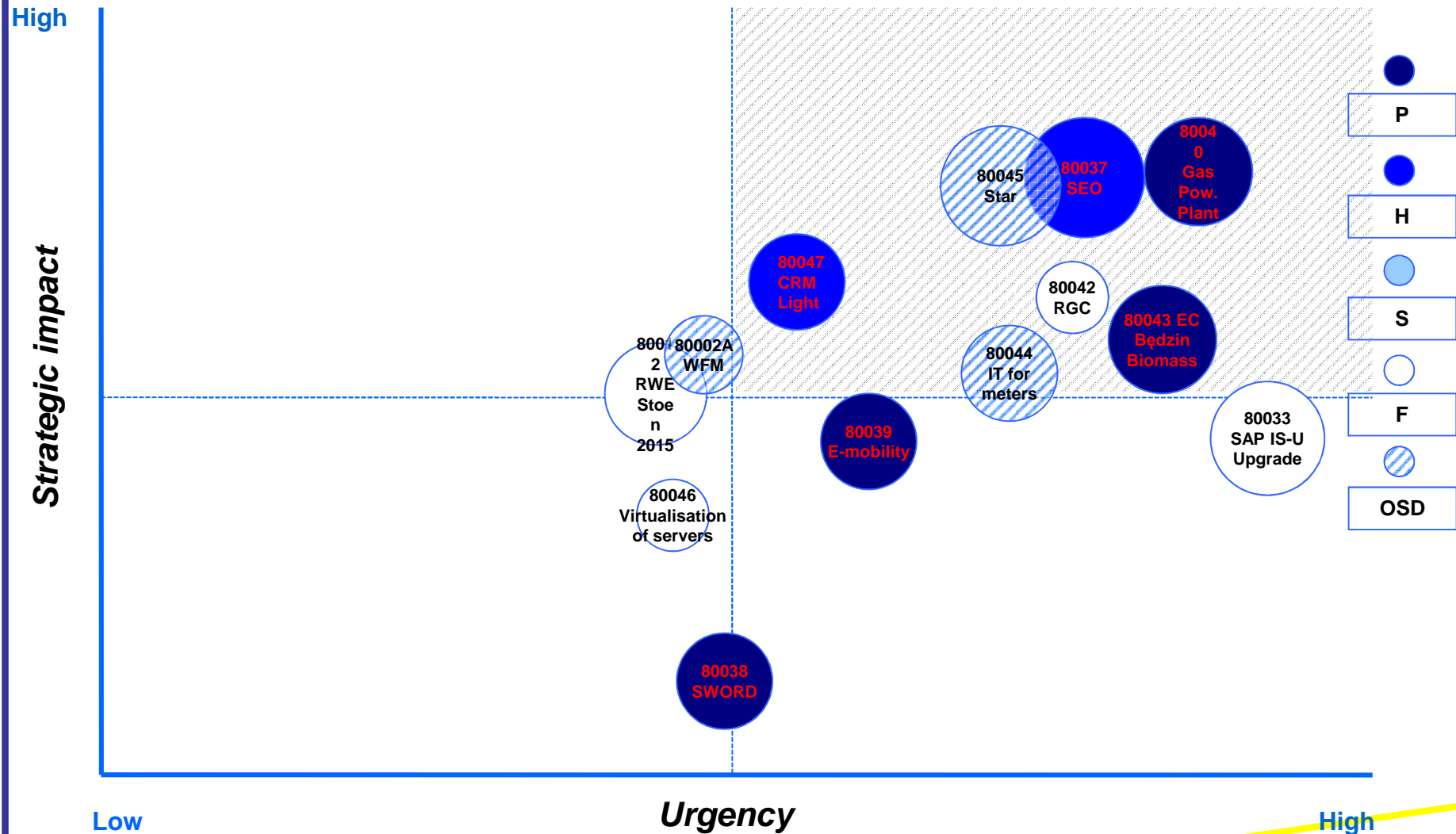
The stakeholders and project participants have to be defined who need reports and than the content and the level of details must be accordingly determined

On the following three pages you see an example of project reporting of RWE Polska

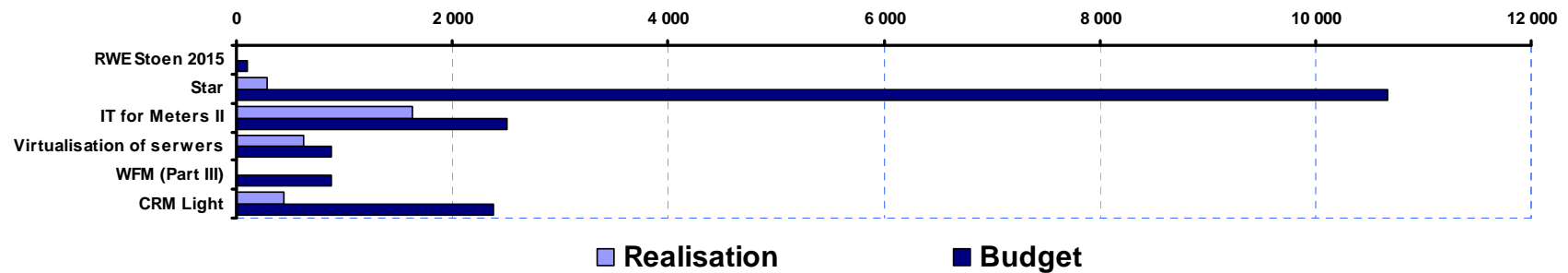
1. Reports in Controlling - Example

Project	Description	Respon- sible	Schedule			Cost			Issues/Risks		
SEO (Sales Efficiency Optimization)	Sales and Customer Service optimization in RWE Polska	xxxI FS	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>
SWORD	Closing of the company planned untill the end of September	xxx PE	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>
Gas power plant	Building xxx	xxx PR	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>
E-mobility	Implementation of power supply column	xxx PR	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>
EC xxx / Biomass	Modernisation of EC xxx	xxx PR	<div><div></div></div>	<div><div></div></div>	Suspended in March		<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>
RGC	Building of a new credit risk management system	xxx FC	<div><div></div></div>	Suspended on January 25		<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>

1. Reports in Controlling - Example



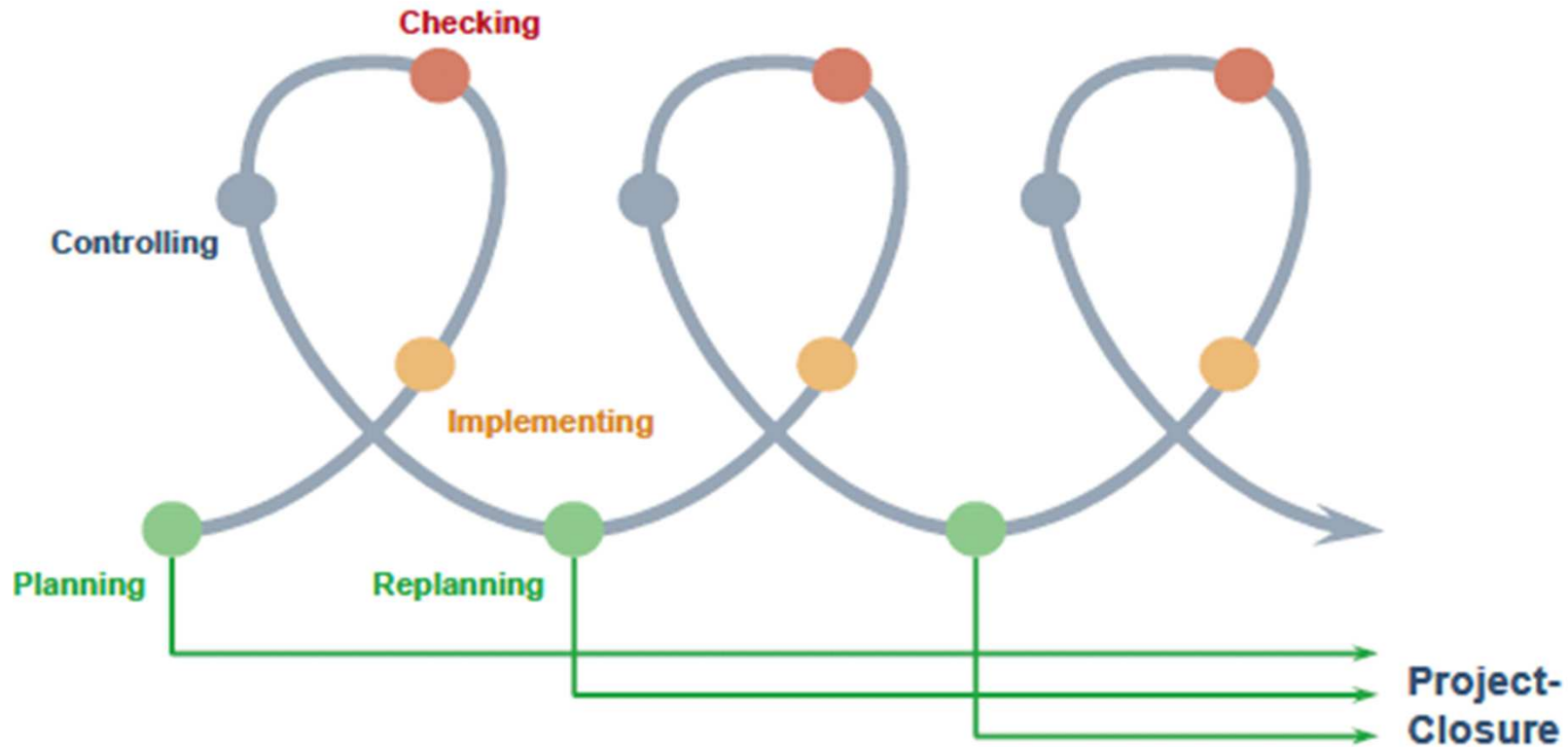
1. Reports in Controlling - Example



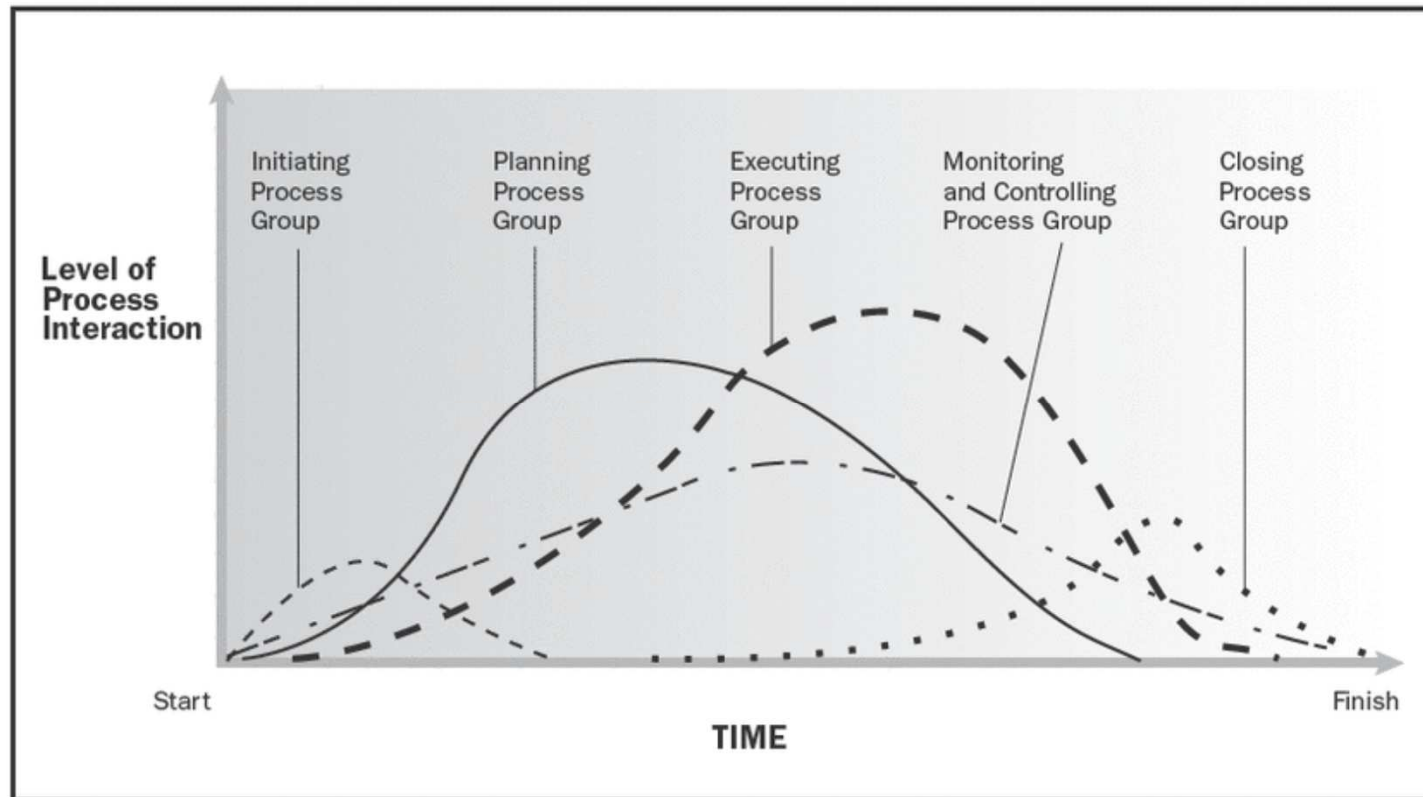
1. Reports in Controlling

Communication Methods	Methods / Tools	When
Formal written	<ul style="list-style-type: none">• Letter• Report• E-mail, Fax• Project Plan• Minutes of Meetings	<ul style="list-style-type: none">• Customer meetings• Team Meetings MoM• Steering Meetings MoM• Change request• Corrective Actions
Formal verbal	<ul style="list-style-type: none">• Presentations• Speeches• Meetings	<ul style="list-style-type: none">• Steering Presentations• Team Meetings
Informal written	<ul style="list-style-type: none">• Memos• Notes• E-mail	<ul style="list-style-type: none">• Team member information• Sponsor's information about meetings
Informal verbal	<ul style="list-style-type: none">• Meetings,• Chats	<ul style="list-style-type: none">• Conflict talks

1. Controlling is done continuously and in cycles

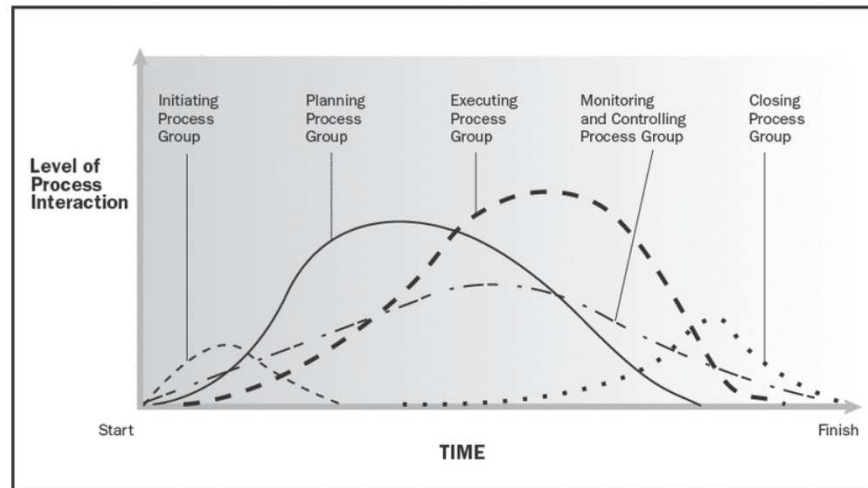


1. Controlling is done by the dedicated group and by „everybody“



1. But Controlling is more and happens also in the initiation group

- Calculating the business case
- Checking the budgets and profits
- Controlling the risks from the beginning
- Verify all plans which will be later object of monitoring



2. Controlling starts with decision taking!

PMBOK, Chapter 4.1.1.2, Develop Project Charter:

The business case or similar document provides the necessary information from a business standpoint to determine whether or not the project is worth the required investment. Typically the business need and the cost-benefit analysis are contained in the business case to justify the project.

- What means:
 - In the beginning we need a BC to evaluate the whole project
 - Based on the BC the decision has to be taken to go or to stop
 - If the assumptions are taken in the BC they are binding for the project plan to avoid „beautiful BC“ and „horrible reality“

How to create a BC?

1. Reports in Controlling - Cockpit



If you want to fly to NY, to walk in a foreign city, to go through a project: you have to control what you do

Think about the cockpit, if you start something new or difficult or dangerous...

Examples:

- What do you need if you fly?
- What do you need to manage a Call Center?
- What do you need to manage a project (for example to implement a software)



2. Decision taking tools from Controlling

Decision taking process includes a business case prepared by the Controlling Department

1. Cost/profit comparison in one point of time
2. Discounted Cash flow (methodology see MP10!)




2. Cost/profit comparison in one point of time

- Calculation of costs and profits of different alternatives and then choosing the cheapest or most profitable solution
- Example: in a project we need a personal transport capacity for one year – the alternatives to
 - a) buy/sell again one car, or
 - b) to take private cars and to pay to the employees or
 - c) to take taxiscan be calculated: the cheapest will win



2. Net present value (NPV)

- The method is taught to you in MP10
- The application of this method is various like
 - Evaluation of a company
 - Deciding between alternatives in finance (see project finance MP17)
 - Deciding between alternatives in a comparison
 - Evaluation of a unique action
- Experience of the author (being 9 years CFO): DFC/NPV is a very often used method in day to day work and the only financial method he learned in the university which is really used regularly all the years after



2. Quick Introduction to Net Present Value / Repetition of MP10

2. What is *Net Present Value*?

$$\text{NPV} = \sum_{t=0}^N \frac{C_t}{(1+r)^t}$$

Net Present Value

- Net Present Value (NPV) is a standard method for the financial appraisal of long – term projects;
- Net Present Value (NPV) is a present value of net cash flows (cash flows discounted back to its present values);

2. What is *Net Present Value*

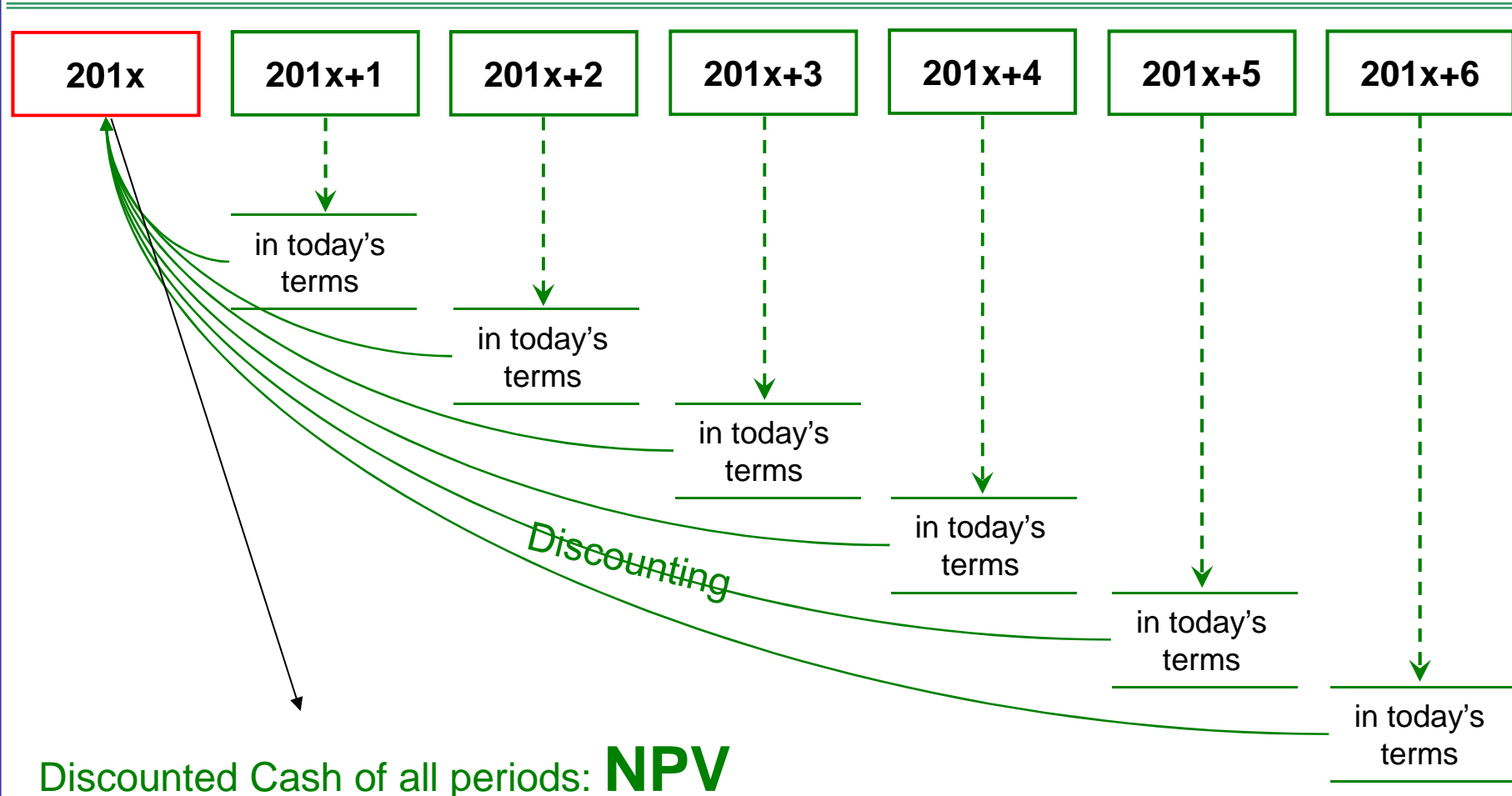
$$NPV = \sum_{t=0}^N \frac{C_t}{(1+r)^t}$$

But what is it?

- Each net cash inflow (cash – in) or outflow (cash – out) is discounted back to its present value
- Then they are summed

2. What is *Net Present Value*?

Cash in – cash out = Cash of a period





2 What is formula all about?

$$NPV = \sum_{t=0}^N \frac{C_t}{(1+r)^t}$$

t = the time of the net cash flow

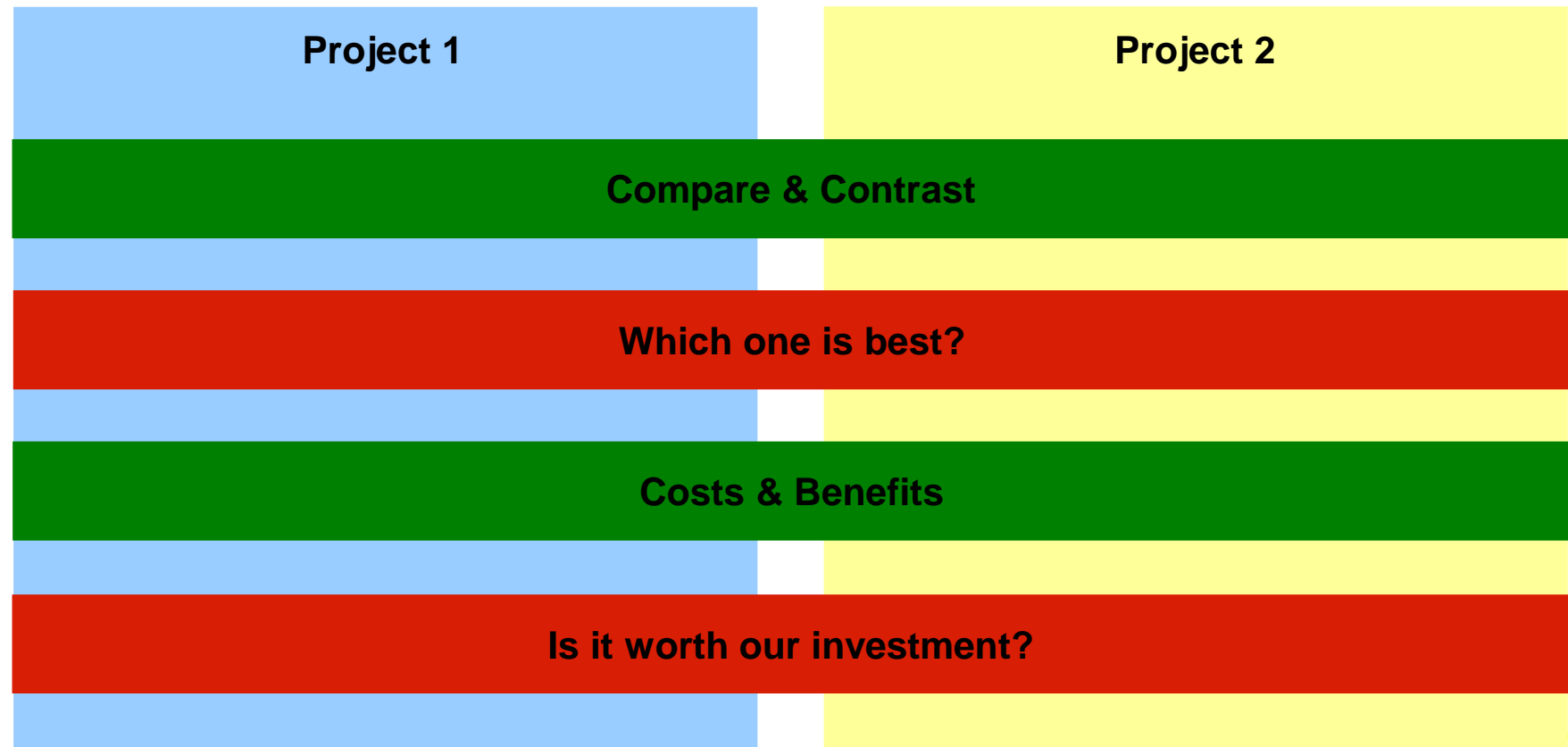
N = the total project duration

r = the discount rate (the minimum rate that should be earned on the project)

C_t = the net cash flow at the time t

2. When is *NPV* used?

- Net Present Value is typically used for two reasons:
 - assessing the value of the project;
 - choosing which project gets priority;

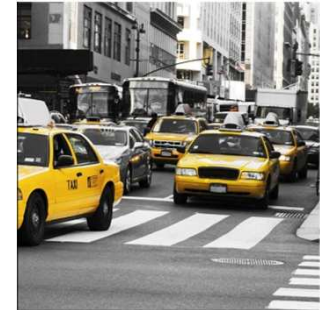


When is *NPV* used?

- Which one is better investment?



to own a car or regularly travel by taxi?



to rent a house or build it?



to invest in education or start working early?



2. NPV in decision making

- NPV is an indicator of how much value an investment or project adds to the firm

If...	It means...	Then...
$NPV > 0$	the investment would add value to the company	the project may be accepted
$NPV < 0$	the investment would subtract value from the company	the project should be rejected
$NPV = 0$	The investment would neither win nor lose value for the company	we should be indifferent in the decision whether to accept or reject the project; the decision should be based on other (e.g. strategic) criteria

2. What is *IRR*?

- Internal Rate of Return (IRR) is:
 - a discount rate for which the NPV = 0;
 - the amount (rate) you need to make your investment worthwhile;
 - based on different factors like e.g. opportunity cost, value of money and risk;

$$IRR \rightarrow \sum_{t=1}^n \frac{CF_t}{(1+r)^t} - I_0 = 0$$



2. Please calculate this example

You are project manager of “new headquarter of your ABC Company”. You know well the current renting costs (24.000 Euro/month all cost inclusive) of your current building – the contract finishes in 12 month but you can prolong the contract for 10 years under the same conditions. All these costs increase with the inflation (predicted by 2 percent/year).

You worked hard on the design of a new building with the same size and functionality. The investment would be ready in one years time if you decide now. You would invest 3 Mio Euro. The costs (electricity, heating...) are 20.000 Euro every 6 month. The move of the company to the new building would cost 500.000 Euro. The building and interior is designed for a use of 10 years.

The interest rate is 5% and there are no taxes. Depreciation rate is 5%. Go step by step in excel and don't use the formulary of Excel but create the formulas on your own in all years

What do you recommend to your board? What happens if you can use the house for 20 years and prolong the contract for 20 years as well?

3. Controlling supports the Project Calculation

- The project calculation is in client oriented projects (selling a bridge to a municipality, selling a software including implementation and training) the core of success
 - It decides to get the job or not (competitors)
 - It decides to have profit or losses because the cost normally cannot be fixed before the project but the client fixes the price for the project before!
 - It is the target for the project team and decides at the end if the project is successful or not
 - It is the basement of controlling – the structure and the content must be „controllable“ and follow some rules
- Even in not client oriented projects (creating a new marketing campaign, project of survey for employee satisfaction) the budget is limited and the costs are one of the main factors for success evaluation

3. Controlling supports the project calculation

- The market situation influences the calculation (new market entry on low profit base? Monopoly with high margin? Will additional business follow like maintenance: than lower margin possible! ...)
- To use subcontractors can move risk to them
- Estimation of cost is needed in all cases of „own production“ because a project is unique. Used methods: expert opinion, copy old calculations (analogy), target costing, technical methods (based on part-/material-list for example), than: analysis of competitors, indirect/administrative costs, margin calculation
- Estimation goes in steps from „rough first idea“ until detailed official offer to a client
- The project calculation must be so detailed at the end (phases – components) to be able to control during the project with IT-tools (e.g SAP PM)
- The calculation must be committed by all (Line manager, sales department, project manager, purchase department...) to move the calculation to be a target of all



3. Controlling includes the control of costs

- Basement of the cost control is the above mentioned detailed structure of the cost calculation (temporary cost centres, subprojects, phases...)
- Cost control can be done by the project manager (small projects), the Project Office, the line managers, a Controlling department
- Beside following the budget and the actual figures controlling means to work on solutions if problems and deviations appear
- „linear“ cost control (eg: 50% of the budget is used) is easy to apply but gives no real overview – example:
 - A project has 10 steps with different time- and cost-needs
 - The project finished step 6 and used 80% of the project time and 90% of the cost budget
 - Can you evaluate if the project is on a good way or not? Maybe steps 7-10 are quick, easy and costless steps: good success! Maybe step 7 needed 40% of time and cost: no success!
- The Method of „Earned Value Management“ (or Earned Value Analysis) is the standard tool for this control – it combines the project steps with cost control and with the time control



4. Earned Value Management

- Earned Value Management” is an industry standard to:
 - Measure a project’s progress and forecast its completion date
 - Control the costs
 - provide schedule variances along the way
- By integrating three measurements, it provides consistent, numerical indicators with which you can evaluate and compare projects

4. Earned Value Management

To start with some definitions...

- Work Breakdown Structure (WBS) = the detailed project steps (lowest level for planning and budgeting which together form the whole project)
- Budget at Completion (BAC) = the sum of all planned costs of all steps in the WBS
- Planned Costs (PC) = the cumulated planned costs until a defined WBS step is finished
- Actual Costs (AC) = the cumulated actual costs in a defined or in the current moment
- Earned Value (EV) = the PC calculated on the basis of the currently fulfilled WBS
- Schedule Variance (SV) = EV in the moment t_n minus PV in the moment t_n (calculated in Euro, if negative the project is currently behind the planned schedule)
- Cost Variance (CV) = EV in the moment t_n minus AC in the moment t_n (calculated in Euro, if negative the project is currently above the planned costs)
- Schedule Performance Index (SPI) = EV / PV in t_n (if $SPI < 1$ the project has a time delay)
- Cost Performance Index (CPI) = EV / AC in t_n (if $CPI < 1$ the project is above the planned cost budget)
- Estimated at Completion 1 (EAC1) = $AC + (BAC - EV) = AC + \text{costs of the planned rest of the project}$
- Estimated at Completion 2 (EAC2) = $AC + (BAC - EV)/CPI = AC + \text{costs of the planned rest of the project adjusted with the actual „cost-behaviour“ visible in the CPI}$
- Estimate to Completion (ETC) = $(BAC - EV)/CPI$
- Estimated at Completion t (EAC_t) = planned total project duration / SPI
- Variance at Completion (VAC) = $BAC - EAC$

4. Earned Value Management

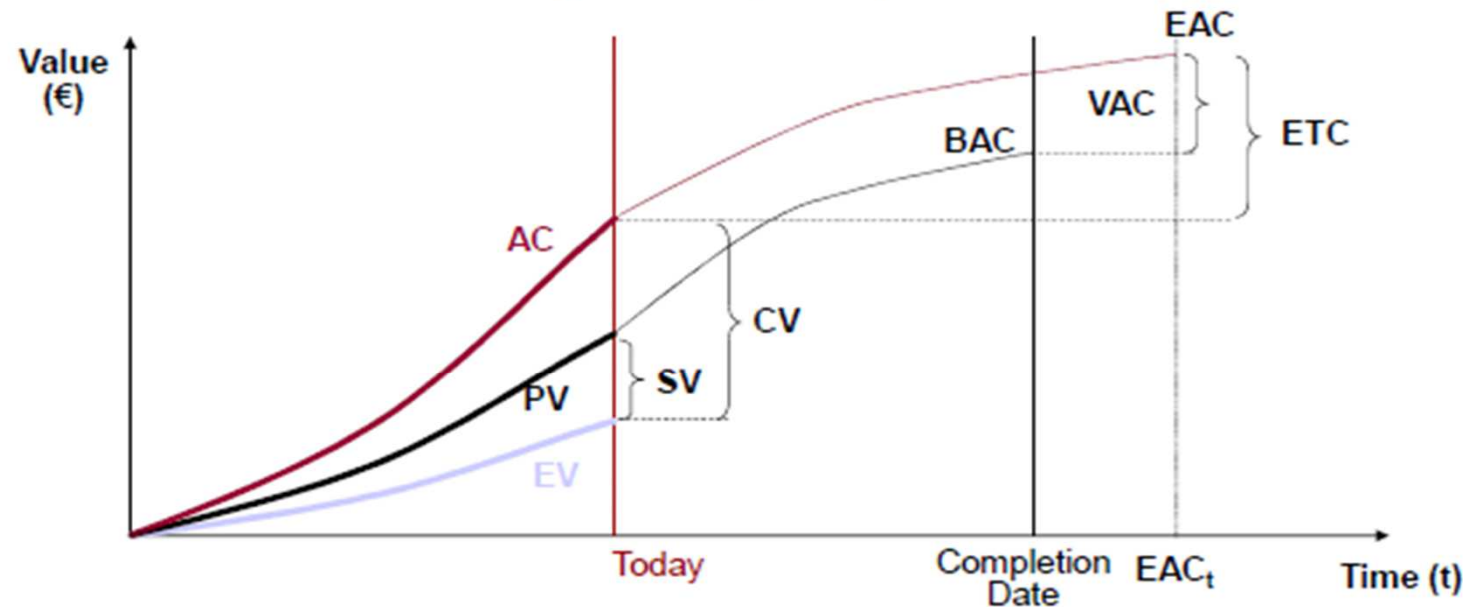
To give an example...

A project is planned in 3 steps: first step: One week duration with 100 Euro costs, second step 2 weeks duration with 400 Euro costs, third step two weeks with 200 Euro costs. After the project started 3 weeks ago the first two steps were now exactly fulfilled and 600 Euros were spent

- Project duration: 5 weeks
- Budget at Completion (BAC) = 700 Euro
- Planned Costs (PC) after 3 weeks = 500 Euro
- Actual Costs (AC) after 3 weeks = 600 Euro
- Earned Value (EV) after 3 weeks = 500 Euro because the project is in time
- Schedule Variance (SV) = 0 (in time!)
- Cost Variance (CV) = - 100 (above the budget!)
- Schedule Performance Index (SPI) = 1 (no time delay)
- Cost Performance Index (CPI) = 0,83 (the project is above the planned cost budget)
- Estimated at Completion 1 (EAC1) = 800 = 600 + 200 (step three)
- Estimated at Completion 2 (EAC2) = 840 = 600 + 200/0,83
- Estimate to Completion (ETC) = 1: 200 and 2: 240
- Estimated at Completion t (EAC_t) = 5 weeks
- Variance at Completion (VAC) = BAC – EAC2 = -140

4. Earned Value Management

Earned Value Management (EVM)



Basic Figures	Current Situation	Forecast
BAC (Budget at completion)	CV (Cost Variance) = EV - AC	EAC (Est. At Compl. real.) = AC + (BAC - EV)/CPI
PV (Planned Value)	SV (Schedule Variance) = EV - PV	ETC (Estimate To Completion) = EAC - AC
EV (Earned Value)	CPI (Cost Performance Index) = EV/AC	VAC (Variance At Completion) = BAC - EAC
AC (Actual Cost)	SPI (Schedule Performance Index) = EV/PV	EAC _t (Est. at Compl. time) = Total duration / SPI



4. Earned Value Management

Please calculate (and paint) all known terms and KPIs of Earned Value Management and comment to your boss the current project status in a few written sentences...

A bridge has to be build. You are project leader and your WBS looks like this:

1. Design of the bridge: 6 month – 1 Mio Euro
2. Projecting the bridge: 6 month – 2 Mio Euro
3. Building the basement in the river and at the riverside: 12 month – 15 Mio Euro
4. Building the bridge – 12 month – 10 Mio Euro
5. Connect it with the streets on both sides – 6 month – 2 Mio Euro
6. Technical check and approval of state authority to open the bridge for secure usage – 1 month – 0,5 Mio Euro

You received the current project report after 36 month after the start. With these information:

1. EV: 30 Mio Euro
2. AV: 32 Mio Euro



Literature:

Please read and know in addition...

- PMBOK Chapter 3.6
- PMBOK Chapter 4.4
- PMBOK Chapter 5.5
- PMBOK Chapter 6.6
- PMBOK Chapter 7
- PMBOK Chapter 8.3
- PMBOK Chapter 11.6
- ICB – IPMA Competence Baseline (selected chapters)
- Kerzner Chapter 14
- Kerzner Chapter 15